

BANGKA: Battery and Navigation Green Kit Assembly

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Researchers, University of the Philippines Diliman

Grand Winner of Clean Air Asia's E-mobility Idea Competition

12 March 2026 | United Nations Conference Centre, Bangkok, Thailand



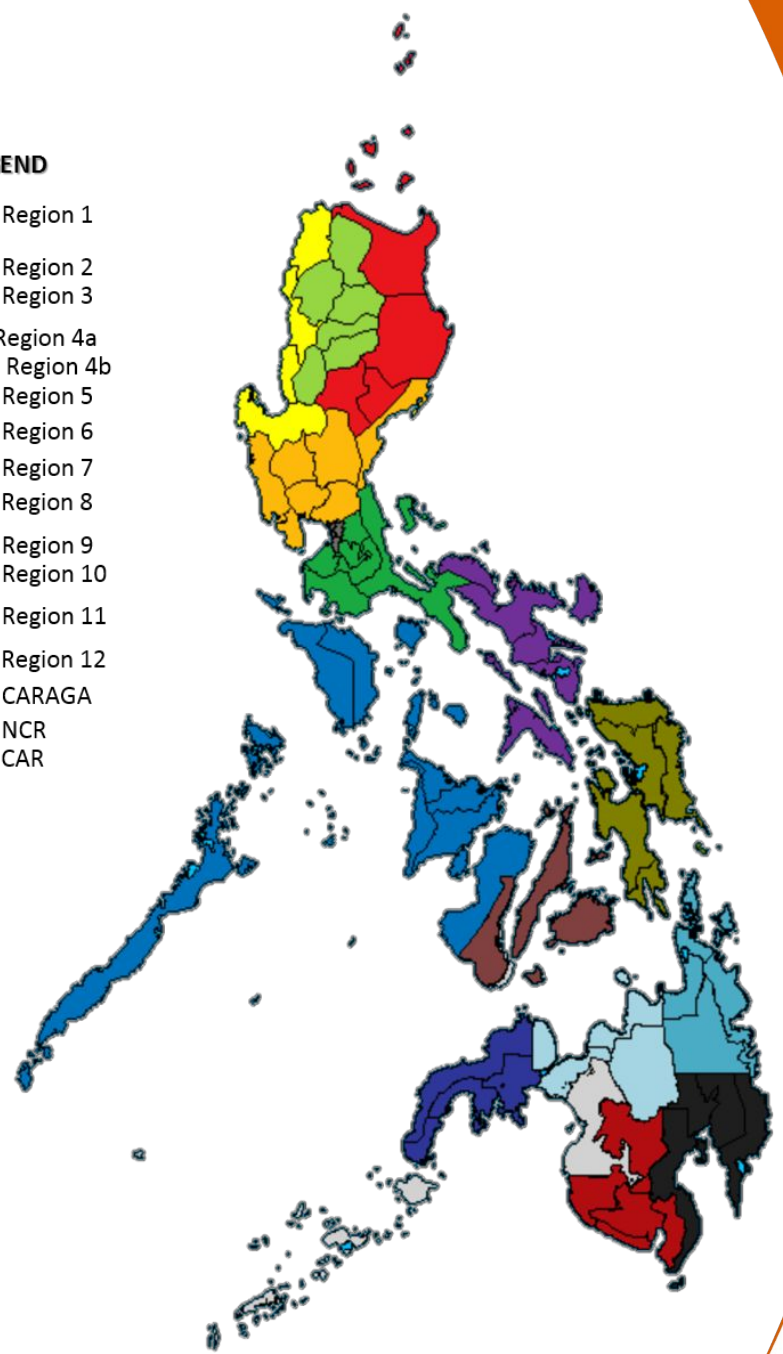
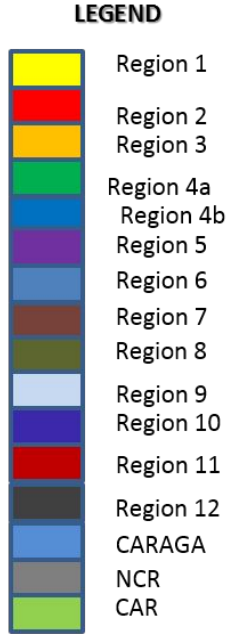
Existing Policy Frameworks of the Philippines

- **Comprehensive Roadmap for the Electric Vehicle Industry (CREVI) [1]**
 - **By 2028: Deploy 7,300 public charging stations**
 - **By 2040: 50% electric vehicle fleet share** in Clean Energy Scenario
- **Electric Vehicle Industry Development Act (EVIDA) [2]**
 - **Goals:**
 - Reduce country's dependence on fossil fuels
 - Lower GHG emissions
 - Contribute to environmental sustainability
 - Action: Transition to **cleaner and energy-efficient transportation options**
- **Philippine Energy Plan (PEP) [3]**
 - **At least 12% reduction in GHG emission** for the Nationally Determined Contribution (NDC)



Sustainable Development Goals [4]





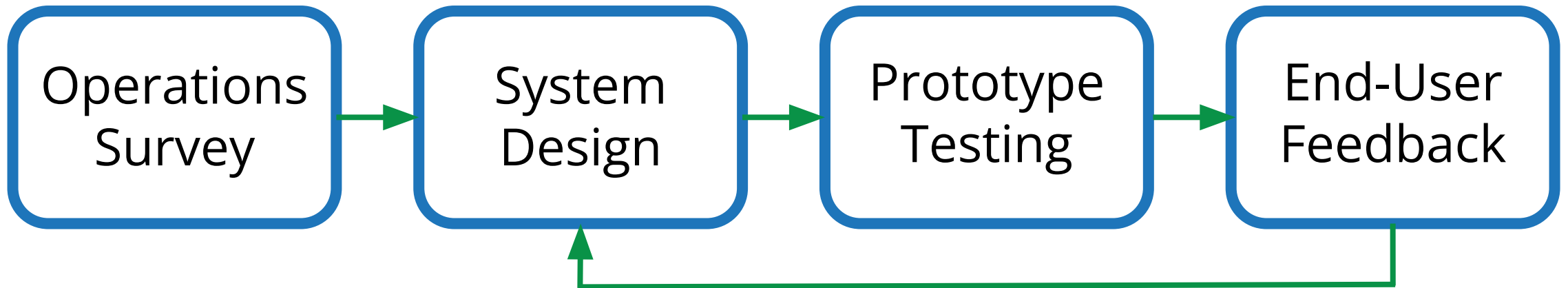
Industry Impact

- Bodies of Water [5]
 - **791 out of 1019** bodies of water are for **beneficial use**
- Fishing [6]
 - Main livelihood for people living in coastal areas
 - Employment: **PHP 2.29 million**
 - Contributes **8.6%** to Ph's **GDP**
- Tourism [7]
 - Generates **PHP 23 billion revenue**
 - Activities:
 - 192 Reef Dives
 - 146 Ocean Dives
 - 91 Scuba Dives

Problems

- High GHG Emissions [8]
 - **Transport sector** contributes **13%** of Ph's total GHG emission
 - **Water-based transport** contributes **8%** of these emissions
- Limited Electrification [1,9]
 - e-trikes, e-jeepneys, e-buses
- Blaring engine noise
 - Compromises hearing of boat operators and onboard passengers
- Threat to energy security
- High daily operating cost [10]

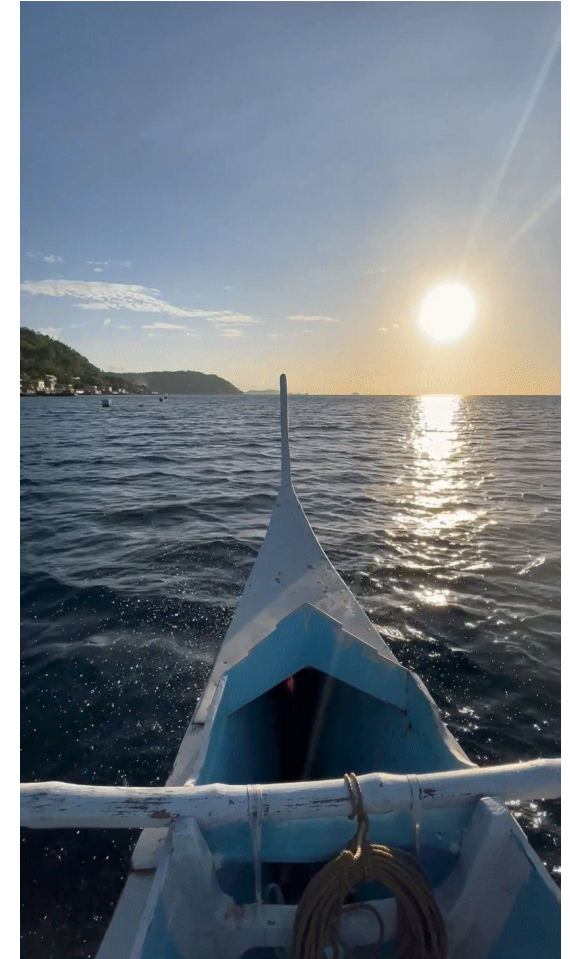
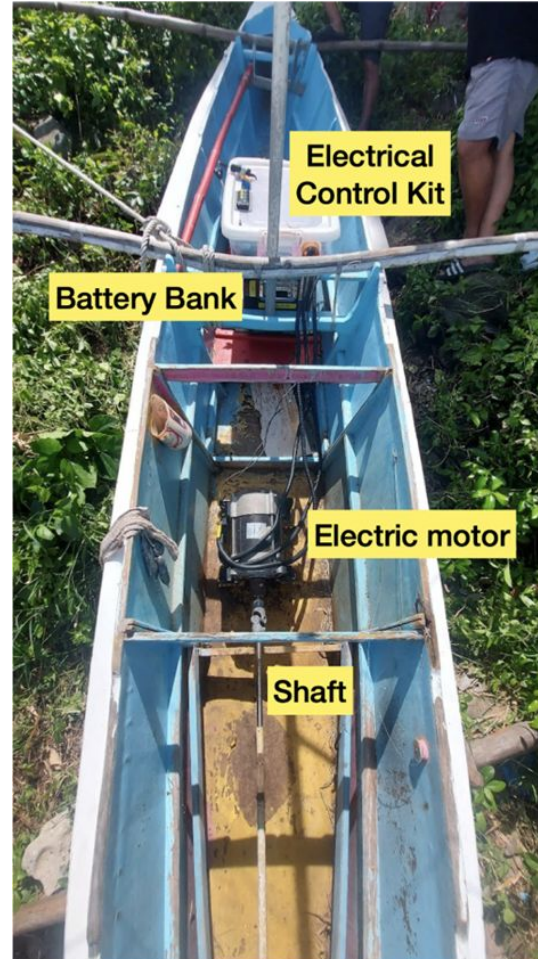
Project Framework



Our Solution

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- Electric Retrofitting Kit
- Plug-and-Play Application
- Easy conversion to electric boats

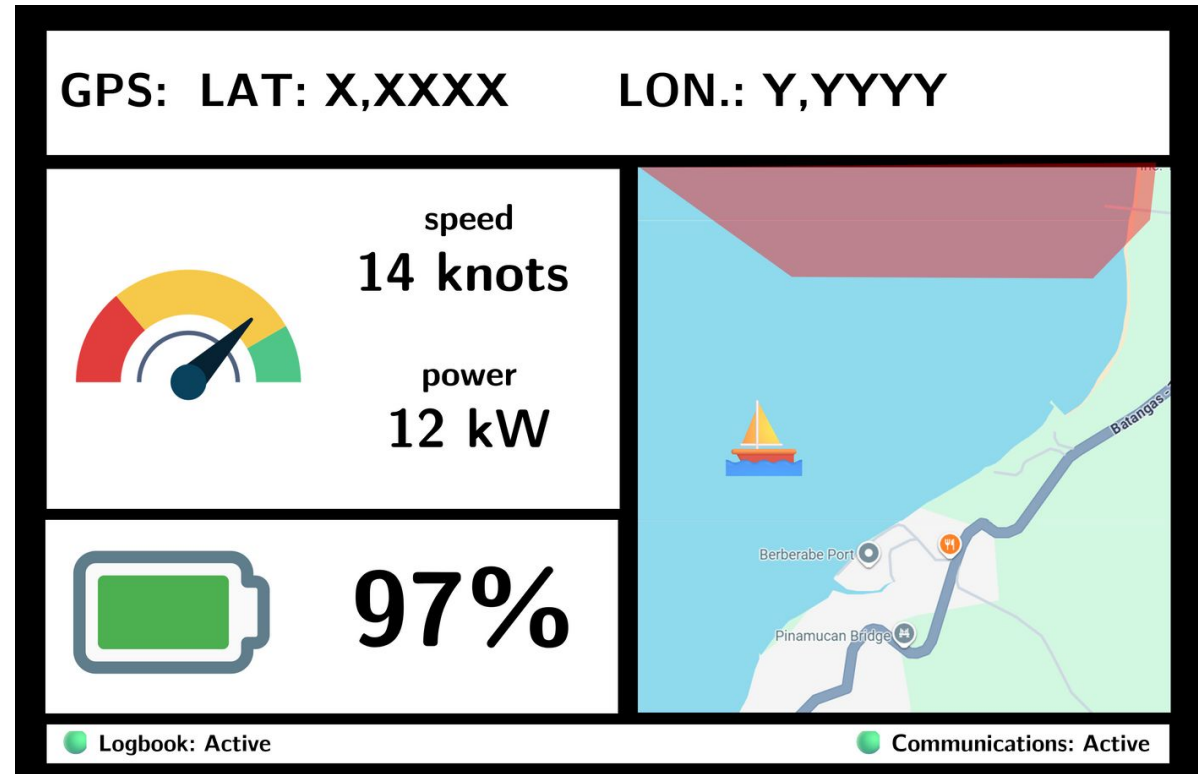


Features

- Silent Operations
- Reduced GHG Emissions
- Needs-based battery capacity
- Needs-based motor power rating
- IP rated for open and marine-ambient environment
- Less daily operating cost
- Friendly user interface

Vessel Interface System

- **Onboard Memory**
 - GPS
 - Activity State
 - Engine Performance
- **Communication Module**
 - Low-power radio or satellite module for reliable data transmission to the livelihood center
- **Navigational Policy Map [12]**
 - Marine Protected Areas (MPA)
 - No-Take Zones
 - Municipal and Commercial Boundaries



Policy Recommendation

- Government Subsidies for Start-ups
- Tax Exemption for Electric Boats
- Low Interest Green Financing
- Charging Infrastructure Development
- Nationwide Campaign for Electric Boat Advocacies
- Pioneered Electrification for Government Fleets
- Zero-Emission Policy for Marine Protected Areas (MPAs)
- R&D Support for Local Manufacturing, Retrofitting, and Other Electric Boat Innovations
- Marine Electrification Roadmap

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Operating Costs

- Fuel Economy
 - ₱9.76/km USD
 - PHP 6/km
- Energy Economy
 - ₱3.56/km USD
 - PHP 2/km
- 63.5% Energy Savings

TABLE II. ENERGY COST PER LOCATION

Location	Electricity Cost per kWh		Energy Cost per km	
	USD/kWh	PHP/kWh	USD/km	PHP/km
Batangas [12]	₱16.2	₱9.22	₱3.56	₱2.03
Siargao [13]	₱14.6	₱8.33	₱3.22	₱1.83
Bataan [14]	₱16.5	₱9.41	₱3.64	₱2.07
Navotas [15]	₱22.2	₱12.64	₱4.88	₱2.78
Mindoro [16]	₱27.5	₱15.65	₱6.05	₱3.44